

CLAIMS

1. An exhaust gas purifying apparatus for a diesel engine, comprising:
 - an NO_x adsorption and reduction type catalyst that adsorbs and reduces NO_x in an exhaust gas; and
 - a diesel particulate filter that collects particulate matters in the exhaust gas from the upstream side of a flow of the exhaust gas, the catalyst and filter being arranged sequentially in an exhaust channel that exhausts the exhaust gas of the diesel engine.
2. The exhaust gas purifying apparatus for the diesel engine according to claim 1, wherein an oxidation catalyst is arranged on the downstream side of the diesel particulate filter viewed from the flow of the exhaust gas.
3. The exhaust gas purifying apparatus for the diesel engine according to claim 2, wherein the oxidation catalyst adsorbs NO_x in the exhaust gas, and is a hydrocarbon adsorption and combustion type catalyst that burns and purifies the NO_x.
4. The exhaust gas purifying apparatus for the diesel engine according to any one of claims 1 to 3, wherein heating means that heats the exhaust gas on the upstream side of the exhaust gas channel of the NO_x adsorption and reduction type catalyst.
5. The exhaust gas purifying apparatus for the diesel engine according to any one of claims 1 to 4, further comprising heating means that heats the diesel particulate filter.

6. The exhaust gas purifying apparatus for the diesel engine according to any one of claims 1 to 5, further comprising:

NOx amount estimation means that estimates an amount of NOx accumulated in the NOx adsorption and reduction type catalyst from a measured value of a physical quantity that stands for an operation condition of the diesel engine such as temperature, an air-fuel ratio, oxygen concentration, and a lean operation time of an exhaust gas that flows into the NOx adsorption catalyst; and

control means that, when the amount of accumulated NOx estimated by the NOx amount estimation means reaches a fixed value, performs control of increasing the temperature of the exhaust gas that flows into the NOx adsorption and reduction type catalyst to temperature necessary for NOx reduction and purification, and supplying fuel that is a reducing agent necessary for reducing accumulated NOx to the exhaust gas.

7. The exhaust gas purifying apparatus for the diesel engine according to claim 6, wherein the fuel that is a reducing agent necessary for reducing NOx is supplied to the exhaust gas by increasing the amount of the fuel supplied to the diesel engine.

8. The exhaust gas purifying apparatus for the diesel engine according to claim 6, wherein the fuel that is a reducing agent necessary for reducing NOx is supplied to the exhaust gas by means of a fuel secondary injection that injects the fuel to an engine combustion chamber in an expansion stroke or an exhaust stroke of the diesel engine.

9. The exhaust gas purifying apparatus for the diesel engine according to any one of claims 1 to 8, further comprising:

exhaust gas temperature measuring means that measures the temperature of the exhaust gas that flows into the diesel particulate filter;

exhaust gas temperature judgment means that judges the exhaust gas temperature measured by the exhaust gas temperature measuring means is lower than a predetermined temperature;

particulate capture amount estimation means that estimates an amount of particulates captured by the diesel particulate filter; and

heating means that heats the exhaust gas, wherein

control of heating the exhaust gas into the predetermined temperature is performed by the heating means, and the particulates captured by the diesel particulate are burned and removed when an estimated value of the amount of particulates estimated by the particulate capture amount estimation means reaches a predetermined capture amount, and the exhaust gas temperature is judged by the exhaust gas temperature judgment means to be lower temperature than the predetermined temperature.

10. The exhaust gas purifying apparatus for the diesel engine according to any one of claims 1 to 9, wherein the NOx adsorption and reduction type catalyst includes at least one type of element chosen from potassium, sodium, magnesium, strontium, and calcium, at least one type of element chosen from a rare earth metal such as cerium, at least one type of element chosen from precious metals such as platinum, rhodium, and palladium, and at least one type of an element chosen from titanium or silicon, and is a composite composed of a

metal, metal oxides, or a compound oxide, or a composite in which the composite is carried in porous heat resistant metal oxides.

11. An exhaust gas purifying method of a diesel engine, comprising the steps of:

arranging an NO_x adsorption and reduction type catalyst that adsorbs and reduces NO_x in an exhaust gas, and a diesel particulate filter that collects particulate matters in the exhaust gas from the upstream side of a flow of the exhaust gas sequentially in an exhaust gas channel that exhausts the exhaust gas of the diesel engine;

reducing and purifying NO_x in the exhaust gas by the NO_x adsorption and reduction type catalyst; and

collecting and removing diesel particulates in the exhaust gas by the diesel particulate filter.